Suggested Topics for Term Papers
Physics 129b

Each student in Physics 129b is expected to write a paper (10 to 20 pages long) on a topic of current interest and to make a half hour presentation (with transparencies) to the class. Below is a list of possible topics. You are free to select from this list, or come up with a subject of your own choosing. A good place to look for other potential topics is the set of reviews on the Particle Data Book web page (http://www-pdg.lbl.gov/). The experiment web pages accessible from the SLAC, Fermilab and CERN web sites also are full of possibilities.

After picking a topic, you should setup an appointment with Professor Shapiro to discuss your choice. You must inform Professor Shapiro of your proposed topic before Monday March 18. Papers are due by Friday May 3. Oral presentations will be schedule for the final month of the semester.

Here are some possible topics:

- Testing QED: $(g-2)$ of the Muon
- The QCD Potential: What do we learn from Quarkonium?
- Quark and Gluon Fragmentation: Properties of jets produced in e^+e^- annihilation
- Measuring α_s (pick a method of your choice)
- Does α_s really run?
- Understanding the structure of the nucleon: recent results on Deep Inelastic Scattering
- Measuring the Number of Neutrino Species at LEP
- Searches for SuperSymmetry at LEP
- Searching the Higgs Boson at LEP
- Measuring the W Mass at LEP
- Measuring the W Mass at the Tevatron

- What have we learned from precision studies of Z decays?
- Observing Gluon Scattering: Jet production at Hadron Colliders
- The Top Quark: its discovery and properties
- Physics goals of the LHC
- Building an LHC Detector: What are the components and the constraints?
- Searching for the Higgs at LHC: How will it be done?
- Can there be extra space-time dimensions and how would we "see" them?
- Should we build an e^+e^- linear collider?
- CP Violation in the B System
- Constaints on the CKM Matrix
- Measuring B Lifetimes: Why and How
- Neutrino Oscillations: The Solar Neutrino Problem
- Neutrino Oscillations: Atmospheric Neutrinos
- What have we learned from the SNO detector?
- Dark Matter: What is it and how do we look for it?
- Searching for the quark-gluon plasma
- The proton lifetime and Grand Unification